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Vibrational modes in the quantum Hall system[1] RACHEL WOOTEN, BIN YAN, Purdue University, KEVIN DAILY, Wolfram Research, CHRIS H. GREENE, Purdue University — The hyperspherical adiabatic technique is more familiar to atomic and nuclear few-body systems, but can also be applied with high accuracy to the many-body quantum Hall problem[2]. This technique reformulates the Schrödinger equation for N electrons into hyperspherical coordinates, which, after extracting the trivial center of mass, describes the system in terms of a single global size coordinate known as the hyperradius R, and $2N-3$ remaining internal angular coordinates. The solutions are approximately separable in the hyperradial coordinate, and solutions in the system are found by treating the hyperradius as an adiabatic coordinate. The approximate separability of the wave functions in this coordinate suggests the presence of hyperradial vibrational modes which are not described in conventional theories. The vibrationally excited states share the internal geometry of their quantum Hall ground states, and their excitation frequencies may vary with the number of participating particles or the strength of the confinement. We plan to discuss the features of these vibrational modes and their possible detection in quantum Hall systems.

[1]NSF
[2]K. M. Daily, R. E. Wooten, and C. H. Greene, Phys. Rev. B, **92** 125427 (2015).

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